



International Workshop on On-Orbit Satellite Servicing

Hosted by the NASA Goddard Space Flight Center

March 24-26, 2010

UMUC Inn and Conference Center / Adelphi, Maryland

Wednesday March 24

- 7:30 AM** **Registration Opens** *Main Concourse*
- 8:15 AM** **Welcome and Announcements** *Chesapeake/Ft. McHenry Room*
- Ron Ticker, Manager for Space Station Development, NASA Headquarters; Chair of International Workshop on On-Orbit Satellite Servicing
- 8:30 AM** **Plenary Session** *Chesapeake/Ft. McHenry Room*
- Christopher Scolese, Associate Administrator, NASA
 - David Radzanowski, Deputy Associate Administrator for Program Integration, NASA
NASA Perspectives on Developing Spacecraft Servicing Capabilities
 - Dr. Stephen Huybrechts, Vice President, Applied Minds, Inc.
On-Orbit Servicing Systems Should Be Flexible
 - Ed Horowitz, Founder and Board Member, U.S. Space LLC
The Role of the Private Sector
- 10:30 AM** **Servicing Study Objectives**
- Frank Cepollina, Deputy Associate Director, Space Servicing Capabilities Office, NASA Goddard Space Flight Center
- 10:40 AM** **Break** *Refreshments provided in Main Concourse*
- 11:00 AM** **Missions and Customers of Satellite Servicing** *Chesapeake/Ft. McHenry Room*
- **Session Chair:** Dr. Harley Thronson, Associate Director for Advanced Concepts in Astrophysics, NASA Goddard Space Flight Center
 - **Keynote Speaker:** Dr. Matt Mountain, Director, Space Telescope Science Institute
 - Dr. Dan Lester, Research Fellow, University of Texas, Astronomy Department
Servicing and Lagrange Point Operations for Astronomy
 - Dr. Charley Noecker, Staff Consultant, Ball Aerospace & Technologies Corp.
External Occulter Planet Finder Mission at L2 – A Potential “Customer” for Robotic Servicing
 - Dr. William R. Oegerle, Director, Astrophysics Science Division, NASA Goddard Space Flight Center
Servicing ATLAST!
- 12:15 PM** **Lunch and Lunchtime Presentations** *Food provided in Main Concourse*
Presentations located in Chesapeake/Ft. McHenry Room
- Steven Johnston, Director of Advanced Space Exploration, The Boeing Company

- The Future in Commercial Human Space Flight
- Bernard Kutter, Manager, Advanced Programs, United Launch Alliance
United Launch Alliance Launch Services
- Bob Richards, Vice President, Human Spaceflight Systems
Orbital's ISS Resupply Service
- Barry Miller, Systems Engineer, Stf, Lockheed Martin Space Services Company
On-Orbit Satellite Servicing – Overview of Lockheed Martin Satellite Servicing Capabilities and Products
- Baard Eilertsen, Senior Vice President, Business Development, Swedish Space Corporation
The Orbital Life Extension Vehicle - an AOCS Backpack

1:45 PM Missions and Customers of Satellite Servicing, continued *Chesapeake/Ft. McHenry Room*

- Dr. Matthew Greenhouse, Astrophysicist, NASA Goddard Space Flight Center
Extra-Zodiacal Exploration: An Architecture for Servicing-Sustained Cosmic Discovery
- Bruce Campbell, Manager, Integrated Design Center, NASA Goddard Space Flight Center
Solar Sail Assembly/Deployment in Earth Orbit: An Enabling Capability for an Enabling Capability
- Dallas Bienhoff, Manager, In-Space & Surface Systems, The Boeing Company
LEO Depot Servicing Impact on Space Missions
- Tom Kessler, Program Manager, Boeing Advanced Systems
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2:45 PM Missions and Customers of Satellite Servicing Question and Answer Session

- *Keynote speaker and all presenters*

3:15 PM Break *Refreshments provided in Main Concourse*

The Missions and Customers of Satellite Servicing Break-out Session begins at 3:15 PM in Room 1123.

3:45 PM Business and Commercial Case for Satellite Servicing *Chesapeake/Ft. McHenry Room*

- **Session Chair:** Mansoor Ahmed, Associate Director of Flight Projects for the Astrophysics Projects Division, NASA Goddard Space Flight Center
- **Keynote Speaker:** Joe Rothenberg, International Development and Integration, Swedish Space Corporation
Commercial Satellite Servicing Needs and Challenges
- Charles Miller, Senior Advisor for Commercial Space, NASA Headquarters
Fostering a Commercial Satellite Servicing Industry
- Baard Eilertsen, Senior Vice President, Business Development, Swedish Space Corporation
Market Interest in Fleet Management On-Orbit Services
- Bretton Alexander, President, Commercial Spaceflight Federation
Commercial Human Spaceflight
- Zach Bailey, Graduate Student, Massachusetts Institute of Technology
Determining the Value of On-Orbit Telescope Servicing
- Barry Miller, Systems Engineer, Stf, Lockheed Martin Space Services Company
On-Orbit Satellite Servicing – Is There a Case?

5:25 PM Business and Commercial Case for Satellite Servicing Question and Answer Session

- *Keynote speaker and all presenters*

5:55 PM Conclusion of Business and Commercial Case for Satellite Servicing Question and Answer Session

Business and Commercial Case for Satellite Servicing Break-out Session: Room 1123, time TBA.

Thursday March 25

7:30 AM **Registration Opens** *Main Concourse*

8:30 AM **Servicing with Humans Session** *Chesapeake/Ft. McHenry Room*

- **Session Chair:** Jim Corbo, Systems Engineering Manager, Space Servicing Capabilities Office
- **Keynote Speaker:** Dr. John Grunsfeld, Deputy Director, Space Telescope Science Institute
Hubble Servicing Mission 4
- Dr. Marc Postman, Astronomer, Space Telescope Science Institute
The Science Rationale for Servicing and Considerations for Existing and Future Space-based
Astronomical Observatories
- Dr. Donald Hall, Astronomer, Institute for Astronomy, University of Hawaii
SpaceStation Telescopes – the Hubble Legacy
- Max Vozoff, Director, Civil Business Development, SpaceX
SpaceX Dragon as an In-Orbit Servicing Platform
- Dallas Bienhoff, Manager, In-Space and Surface Systems, The Boeing Company
Human Servicing Mission to Sun-Earth L2 Telescopes
- Mike Gold, Director, D.C. Operations & Business Growth, Bigelow Aerospace
Expanding the Final Frontier: The Bigelow Aerospace Story

10:15 AM **Break** *Refreshments provided in Main Concourse*

10:45 AM **Servicing with Humans Session, continued** *Chesapeake/Ft. McHenry Room*

- Dr. Harley Thronson, Associate Director for Advanced Concepts in Astrophysics, NASA Goddard
Space Flight Center
Human Servicing Operations Beyond LEO: Gateways and Precursor Concepts
- Sam Scimemi, Deputy, International Space Station, NASA Headquarters within the Space Operations
Mission Directorate
- Scott Christiansen, Engineering Director, Sierra Nevada Corporation – Space Systems
SNC Advanced Manipulator Technology for Spacecraft Servicing

11:30 AM **Servicing with Humans Question and Answer Session** *Chesapeake/Ft. McHenry Room*

- *Keynote speaker and all presenters*

The Servicing with Humans Break-out Session begins at 1:00 PM in Room 1123.

12:00 PM **Lunch** *Provided in Main Concourse*

Lunchtime Presentation *Chesapeake/Ft. McHenry Room*

- Lt. Col. Fred Kennedy, Space Lead, Space & C4ISR Branch, Joint Staff/J-8, Department of Defense
Orbital Express

1:00 PM **Robotic Servicing Technology Session**

- **Session Chair:** Jill McGuire, Robotic Technology Manager, Space Servicing Capabilities Office
- **Keynote Speaker:** Dr. Glen Henshaw, Roboticist, U.S. Naval Research Laboratory
Orbital Robotic Servicing
- Don McMonagle, Vice President of NASA Programs, Raytheon Missile Systems
Raytheon Sarcos Robotic Systems: Technology for Application to Satellite On-Orbit Servicing
- John Lymer, Chief Engineer, Robotics, MDA Corporation
Robotic Solutions for On-Orbit Servicing
- Brian Wilcox, Principal Investigator, NASA Jet Propulsion Laboratory
Lessons Learned At JPL about Servicing
- Dr. Robert Ambrose, Chief, Software, Robotics and Simulation Division, NASA Johnson
Space Center
Dexterous Robotics and the Robonaut Series
- Daniel Rey, Head, Exploration Systems, Canadian Space Agency
CSA Activities in On-Orbit Robotic Servicing

- 2:45 PM** **Break** *Refreshments provided in Main Concourse*
- 3:15 PM** **Robotic Servicing Technology Session, continued**
- Dr. Dave Akin, Director, Space Systems Laboratory, University of Maryland
Robotic and EVA/Robotic Servicing: Past Experience, Future Promise
 - Bill Vincent, Aerospace Engineer, U.S. Naval Research Laboratory
Front End Robotic Enabling Near-Term Demonstration (FRIEND) Technologies and Associated Servicing Architecture
 - Todd Colangelo, East Coast Operations Manager, Oceanering Space Systems
Oceanering Robotics: Parallels to Satellite Servicing
 - Kiel Davis, Vice President, Engineering, Honeybee Robotics Spacecraft Mechanisms Corporation
Honeybee Robotics: An Overview of OOS Capabilities
 - Doyle Towles, Systems and Advanced Technologies Manager, ATK Space Systems
Improved Robotic Enablers for Satellite Servicing
 - Professor Louis Whitcomb, Professor, John Hopkins University
Enabling Technologies for Remote Robotic Manipulation with Time Delay
- 4:45 PM** **Robotic Servicing Technology Question and Answer Session**
- *Keynote speaker and all presenters*
- 5:15 PM** **Conclusion of Robotic Servicing Technology Question and Answer Session**
- Robotic Servicing Technology Break-out Session: location and time TBA.*

Friday March 26

- 7:30 AM** **Registration Opens** *Main Concourse*
- 8:15 AM** **Servicing Technology Session** *Chesapeake/Ft. McHenry Room*
- **Session Chair:** Tupper Hyde, Associate Chief of the Mission Engineering and Systems Analysis Division, NASA Goddard Space Flight Center
 - Dr. David Chato, Aerospace Engineer, NASA Glenn Research Center
In-Orbit Fluid Transfer for Satellite Servicing
 - Therese Griebel, Space Flight Systems Manager, NASA Glenn Research Center
Solar Electric Propulsion Application for Orbital Servicing
 - Joe Cassady, Director, Business Development—Emerging Space Systems, Aerojet
Innovative In-Space Propulsion for Spacecraft Servicing
 - Joseph Maly, Associate Principal Engineer, CSA Engineering, Inc./Moog
ESPA as Base Vehicle for Servicing Missions
 - Warren Frick, Program Manager, Orbital Science Corporation
Satellite Servicing Using the Cygnus Advanced Maneuvering Vehicle
 - Dr. Javier De Luis, Vice President of R&D, Aurora Flight Sciences & Ms. Swati Mohan, Graduate Research Assistant, Massachusetts Institute of Technology
SPHERES as a Servicing Testbed
 - Ian T. Mitchell, Division Staff, Charles Stark Draper Laboratory
Autonomous Rendezvous and Proximity Operations
 - Kevin Miller, Ball Aerospace and Technologies Corporation
Advanced Imaging and Relative Navigation Technology for Satellite Servicing
- 10:15 AM** **Break** *Refreshments provided in Main Concourse*

- 10:45 AM** **Servicing Technology Session, continued** *Chesapeake/Ft. McHenry Room*
- Tom Gardner, Senior Principal Systems Engineer—NASA/Space Applications Group, Raytheon GN&C and Sensors for Rendezvous and Capture; Missile Systems Technology Applied to the On-Orbit Servicing Challenge
 - Dr. Roger Stettner, President, Advanced Scientific Concepts, Inc. 3D Flash LIDAR Cameras for OOS Applications
 - Stéphane Ruel, Project Manager, Neptec TriDAR Model Based Tracking Vision System for On-Orbit Servicing
- 11:30 AM** **Servicing Technology Session Question and Answer Session**
- *All presenters*
- Servicing Technology Break-out Session: location and time TBA.*
- 12:00 PM** **Closing Remarks** *Chesapeake/Ft. McHenry Room*
- Frank Cepollina, Deputy Associate Director, Space Servicing Capabilities Office
- 12:15 PM** **Conclusion of International Workshop on On-Orbit Satellite Servicing**